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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Hasan Nejad

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EXAMINER

PRENTY, MARK V

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 11/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EX

<b>Office Action Summary</b>	Application No. 10/761,247	Applicant(s) NEJAD ET AL.	
	Examiner MARK PRENTY	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 September 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 41-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 41-52 and 54-60 is/are rejected.
- 7) ☒ Claim(s) 53 and 55 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

This Office Action is in response to the amendment filed on September 20, 2005.

Independent claim 55 is objected to because "an upper ferromagnetic" is unclear. Correction is required (i.e., such should apparently read "an upper ferromagnetic layer").

Claims 55-60 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claim 55 is indefinite because "said patterned bottom layer" lacks antecedent basis. Claims 56-60 depend on independent claim 55 and are thus similarly indefinite.

Claims 56 and 59 are further indefinite because "said bottom layer" lacks antecedent basis.

Claims 41-51 and 55-60 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent 6,709,874 (Ning).

With respect to independent claim 41, Ning discloses a magnetic random access memory structure (see the entire patent, including the Fig. 4 disclosure) comprising: a longitudinally extending planarized conductive line 218/220 formed within an insulating layer 212; an electroplated bottom sense layer (i.e., magnetic stack 222's bottom metal stack, which can be formed by electroplating – see column 6, lines 59-62 together with column 6, lines 35-38) over said conductive line; a nonmagnetic tunnel barrier layer (i.e., magnetic stack 222's thin dielectric layer) over said sense layer; a pinned layer (i.e., magnetic stack 222's top metal stack) over said nonmagnetic layer; and at least one electrical conductor 226/228/230 in contact with said pinned layer.

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Claim 41 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 42, Ning's sense layer is formed of NiFe (see column 6, lines 54-58).

Claim 42 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 43, Ning's insulating layer 212 is selected from the group consisting of BPSG, SiO, SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub> and polyimide (see column 6, lines 1-7).

Claim 43 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 44, Ning's nonmagnetic layer is aluminum oxide (see column 7, lines 1-3).

Claim 44 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 45, Ning's sense layer is a ferromagnetic sense layer (see column 6, lines 54-59).

Claim 45 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 46, Ning's pinned layer is formed of a plurality of layers to produce a ferromagnetic pinned layer (see column 7, lines 4-6).

Claim 46 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to independent claim 47, Ning discloses a processor-based system (see the entire patent, including the Fig. 4 disclosure), comprising: a processor (note column 1, lines 46-51); and an integrated circuit coupled to said processor, said integrated circuit including a plurality of magnetic random access memory cells, each of said magnetic random access memory cells including an electroplated bottom sense layer (i.e., magnetic stack 222's bottom metal stack, which can be formed by

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electroplating – see column 6, lines 59-62 together with column 6, lines 35-38) formed over a planarized conductor 218/220, a nonmagnetic layer (i.e., magnetic stack 222's dielectric layer) formed over said sense layer and a pinned layer (i.e., magnetic stack 222's top metal stack) formed over said nonmagnetic layer.

Claim 47 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 48, Ning's sense layer is formed of NiFe (see column 6, lines 54-58).

Claim 48 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 49, Ning's nonmagnetic layer is aluminum oxide (see column 7, lines 1-3).

Claim 49 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 50, Ning's sense layer is a ferromagnetic sense layer (see column 6, lines 54-59).

Claim 50 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 51, Ning's pinned layer is formed of a plurality of layers to produce a ferromagnetic pinned layer (see column 7, lines 4-6).

Claim 51 is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to independent claim 55, Ning discloses a magnetic random access memory structure (see the entire patent, including the Fig. 4 disclosure) comprising: a longitudinally extending planarized conductive line 218/220 formed within an insulating layer 212; an electroplated ferromagnetic layer (i.e., magnetic stack 222's bottom metal stack, which can be formed by electroplating – see column 6, lines 59-62 together with

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column 6, lines 35-38) over said conductive line; a nonmagnetic tunnel barrier layer (i.e., magnetic stack 222's thin dielectric layer) over said electroplated ferromagnetic layer; an upper ferromagnetic layer (i.e., magnetic stack 222's top metal stack) over said nonmagnetic layer; and at least one electrical conductor 226/228/230 in contact with said upper layer.

Claim 55, at least insofar as understood, is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 56, Ning's electroplated ferromagnetic layer is formed of NiFe (see column 6, lines 54-58).

Claim 56, at least insofar as understood, is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 57, Ning's insulating layer 212 is selected from the group consisting of BPSG, SiO, SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub> and polyimide (see column 6, lines 1-7).

Claim 57, at least insofar as understood, is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 58, Ning's nonmagnetic layer is aluminum oxide (see column 7, lines 1-3).

Claim 58, at least insofar as understood, is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 59, Ning's electroplated ferromagnetic layer is a ferromagnetic sense layer (see column 6, lines 54-59).

Claim 59, at least insofar as understood, is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

With respect to dependent claim 60, Ning's upper layer is formed of a plurality of layers to produce a ferromagnetic pinned layer (see column 7, lines 4-6).

Claim 60, at least insofar as understood, is thus rejected under 35 U.S.C. 102(e) as being anticipated by Ning.

Claims 52 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 6,709,874 (Ning) together with United States Patent 6,793,961 (Nikitin).

Claims 52 and 54 depend on independent claim 41, which is rejected above under 35 U.S.C. 102(e) as being anticipated by Ning. The above explanation of the rejection of independent claim 41 under 35 U.S.C. 102(e) as being anticipated by Ning is hereby incorporated by reference into this rejection of dependent claims 52 and 54 under 35 U.S.C. 103(a) as being unpatentable over Ning together with Nikitin.

With respect to dependent claims 52 and 54, although Ning discloses that its bottom sense layer can be formed by electroplating, Ning does not disclose the electroplating particulars. Nikitin, however, teaches that an electroplated layer is formed in openings made in a thicker dielectric layer (see Nikitin's Figs. 9(a)-9(d) disclosure, for example). It would have been obvious to one skilled in this art to form Ning's electroplated bottom sense layer in openings made in a thicker dielectric layer because Nikitin teaches that an electroplated layer is conventionally formed in openings made in

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a thicker dielectric layer. Claims 52 and 54 are thus rejected under 35 U.S.C. 103(a) as being unpatentable over Ning together with Nikitin.

Claim 53 is objected to as being dependent upon a rejected base claim, but would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The applicants' arguments with respect to the maintained rejection of claims under 35 U.S.C. 102(e) as being anticipated by Ning are incorrect.

First, the applicants' allegation: "The Office Action asserts that the bottom metal stack of Ning could be formed by electroplating," is incorrect. The Office Action does not merely assert that Ning's bottom metal stack "could be formed by electroplating." Rather, the maintained rejection actually asserts: "Ning discloses...an electroplated bottom sense layer (i.e., magnetic stack 222's bottom metal stack, which can be formed by electroplating – see column 6, lines 59-62 together with column 6, lines 35-38)." In other words, the maintained rejection asserts and demonstrates that Ning discloses that its bottom sense layer can be formed by electroplating (for example).

The applicants correctly remark: "The question is does the [Ning] reference teach or suggest an electroplated layer." The answer is Ning does teach or suggest an electroplated bottom sense layer (again, as explained in the rejection, see Ning at column 6, lines 59-62 together with column 6, lines 35-38).

The applicants' allegation: "The Office Action points to the description in col. 6, lines 35-38 as allegedly teaching that the bottom metal stack layers are electroplated," is incorrect. The rejection actually points to Ning's "column 6, lines 59-62 together with

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column 6, lines 35-38," which together disclose that Ning's bottom metal stack layers can be electroplated. Specifically, Ning discloses at column 6, lines 59-62: "Various techniques such as physical vapor deposition (PVD), evaporation, ion sputtering, and chemical vapor deposition (CVD) may be used to deposit the magnetic layers of bottom metal stack," and discloses at column 6, lines 35-38: "First metal cap layer 220 may be deposited by PVD, CVD, or may be electroless-plated and selectively deposited." Given that Ning discloses that "various" techniques "such as" PVD and CVD may be used to form its bottom metal stack, and also discloses electroplating deposition as an alternative to PVD and CVD, Ning discloses that its bottom metal stack, and hence its bottom sense layer, can be electroplated.


The applicant's allegation: "[Ning's] first metal cap layer 220 is deposited to a thickness in the range of 10 to 150 nanometers. Ning does not disclose electroless plating deposition of layers, such as those in the bottom metal stack, which have thicknesses in the range of 400 Angstroms or less," is incorrect. Specifically, Ning discloses that its cap layer 220 can be electroplated (see column 6, lines 35-38) and have a thickness in the range from 10 to 150 nanometers (i.e., 100 to 1500 Angstroms).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Registered practitioners can telephone the examiner at (571) 272-1843. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the Application/Control (Serial) Number. Technology Center 2800's general telephone number is (571) 272-2800.

  
Mark V. Prenty  
Primary Examiner